

MINING

Project Fact Sheet



DENSITY SEPARATION IN COMPLEX-MODE VIBRATION FLUIDIZED BEDS

INNOVATIVE VIBRATING BEDS ELIMINATE ENERGY-INTENSIVE DRYING PROCESS FOR SEPARATING COAL AND MINERALS

Benefits

- Saves up to 90% of the energy used by conventional processes by eliminating the coal-drying step
- Reduces air emissions, including greenhouse gases, because of reduced energy consumption
- Saves an estimated one billion gallons of fuel oil and \$500 million in expenditures for energy for drying if the new process is used for 10% of the coal produced annually in the United States
- Reduces wastewater cleanup and disposal needs dramatically
- Decreases use of eight million tons of coal energy per year if the drying step is not needed at the 288 coal preparation plants in North America

Applications

This invention was developed to be used in the coal and minerals processing sectors of mining. However, it has potential applications to many other processing steps where fluidized beds are used, such as in food processing and energy production.

To reduce energy needed to dry mined coal and cut down on wastewater cleanup and disposal, a new, generic method of separating coal through complex-mode vibration in a fluidized bed has been developed. These innovative vibrating beds eliminate the need to process the coal through a wet slurry removal process, saving energy and time.

In large mining operations, a thousand or more tons of coal may be processed each hour. The best large-scale density separation method available until now has been water flotation, which requires drying the material after separating and disposing of the wastewater. Unlike simple linear vibrations, the adjustable vibration inducing system can be tuned to produce optimum separations for a variety of different materials.

THE POTENTIAL FOR DRY DENSITY SEPARATION



Nearly 700 million tons of coal are produced each year in the United States by a wet slurry removal process. Replacing the wet removal process with a dry removal process would eliminate the drying stage and lead to significant energy savings.



Project Description

Goal: The goals of this project are to test a larger laboratory-scale model with a variety of actual ore samples of run-of-the-mine coal and to analyze the results. Complex-mode mechanical vibrations, generated by an adjustable vibration inducing system, are used instead of wet slurries to separate streams of crushed solid material into particles of different densities and sizes. More than 20 different parameters, including pitch, whirl, linear, rocking, and oscillation, can be adjusted.

Incisive Engineering is developing this new technology with the help of a grant funded by the Inventions and Innovation Program through the Department of Energy's Office of Industrial Technologies.

Progress and Milestones

- The construction of a larger scale laboratory model has begun.
- A patent application has been filed on the technology.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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